### **IEEE P802.11Wireless LANs**

|  |
| --- |
| PDT AMP Downlink Synchronization Field |
| Date: 2025-9-12 |
| Author(s): |
| Name | Affiliation | Email |
| Weijie Xu | OPPO | xuweijie@oppo.com |
| Steve Shellhammer | Qualcomm Technologies, Inc. | sshellha@qti.qualcomm.com |
| Nelson Costa | HaiLa Technologies | nelson@haila.io |
| You-Wei Chen | MediaTek | you-wei.chen@mediatek.com |
| Yinan Qi | OPPO | v-qiyinan@oppo.com |
| Rui Cao | NXP | rui.cao\_2@nxp.com |
| Panpan Li | Huawei | lipanpan25@huawei.com |
| Bin Qian | Huawei | qianbin14@huawei.com |
| Ke Wang | OPPO | wangke6@oppo.com |
| Lei Zhou | New H3C | zhou.leiH@h3c.com |
| Amichai Sanderovich | Wiliot | amichai.sanderovich@wiliot.com |
| Shengquan Hu | MediaTek | shengquan.hu@mediatek.com |
| Yuxiao Hou | TP-Link Systems Inc. | houyuxiao@tp-link.com.hk |
| Leif Wilhelmsson | Ericsson | leif.r.wilhelmsson@ericsson.com |
|  |  |  |

**Introduction**

This document provides proposed draft text for IEEE 802.11bp draft.

The following Motions apply to this PDT:

* **PM-10**: The AMP-Sync field in AMP Downlink PPDU in 2.4 GHz is defined with chip duration of 2µs for backscattering case.

[Motion #18, [1] and [10]]

* **PM-18**: IEEE 802.11bp defines at least one AMP-Sync in the AMP Downlink PPDU in 2.4 GHz for backscatter communication, and at least one AMP-Sync in the AMP Downlink PPDU in 2.4 GHz for non-backscatter communication. The AMP-Sync is independent of the integrated and non-integrated deployment.

[Motion #33, [1] and [26]]

* **PM-21**:
	+ The carrier waveform for AMP Downlink PPDU is constructed by repeating one predefined base waveform of TBD micro-second, and additional pseudo-random phase is applied to each base waveform
	+ The base waveform definition is TBD.
	+ Note:
		- The SYNC and Data fields are OOK modulated on the carrier waveform.
		- The Excitation field is not OOK modulated.

[Motion #39, [1], [40], [41], [42] and [43]]

* **PM-25**:
	+ IEEE 802.11bp defines 4 base sequences used for AMP DL/UL SYNC field in 2.4GHz frequency band.
		- 1 base sequences, S1, for DL non-backscatter SYNC field.  S1 and a function of S1, are used for different DL data rate.
		- 1 sequence, S2,  for DL backscatter SYNC field.
		- 1 base sequence, S3, for UL active transmission SYNC field.
		- 1 sequence, S4, for UL backscatter SYNC field.
		- Detailed SYNC sequence designs are TBD
	+ Besides the above 4 base sequences, the need of additional sequence S5 is TBD if mono-static and bi-static backscattering UL SYNC field design is different.

[Motion #69, [1] and [69]]

* **PM-26**:
	+ The SYNC, Data field and Excitation field of 11bp DL PPDU use OFDM symbol as base carrier waveform for OOK modulated AMP communication.

[Motion #70, [1], [41], [42] and [70]]

* **PM-30**: IEEE 802.11bp will specify, in 2.4 GHz, DL synchronization sequence with the same chip duration for all data rates for non-backscatter case.

[Motion #76, [1] and [76]]

* **PM-39**: The AMP DL SYNC for backscattering without frequency shift shall differentiate the operating band of sub-1GHz or 2.4GHz.

[Motion #89, [1] and [91]]

* **PM-40**: The Chip Duration of the Downlink Sync Field Transmitted in 2.4 GHz to a non-Backscatter STA shall be 2 µs.

[Motion #90, [1] and [92]]

* **PM-41**:
* The Downlink Sync Field Transmitted in 2.4 GHz to a non-Backscatter STA shall use a Sequence of Chips $W$ to indicate a data rate of 250 kb/s and a Sequence of Chips $\overbar{w}$ to indicate a data rate of 1 Mb/s.
* Note, $\overbar{W}$ is the Logical Complement of $W$.

[Motion #91, [1] and [92]]

* **PM-42**: The Downlink Sync Field transmitted in 2.4 GHz to a non-Backscatter STA consists of two Segments
	+ The first Segment is a Chip Sequence designed to support Sync Field Detection and Timing alignment.
	+ The second Segment is a “Special Segment” which is designed to reduce the False Alarm rate.

[Motion #92, [1] and [93]]

* **PM-43**: The AMP-Sync field of the AMP DL PPDU for non-backscatter STAs in 2.4 GHz, shall support both the correlation-based Sync field detector and the differential decoder Sync field detector.

[Motion #93, [1], [94] and [95]]

***TGbp editor: Please add the following subclause 40.3.8.2.2:***

**40.3.8.2.2 AMP DL synchronization field**

The AMP-Sync field use OFDM symbol as carrier waveform (see 40.3.3.1) and shall be constructed as an OOK signal.

For the non-backscatter mode, the AMP-Sync field consists of two segments: *NAMETBD1* and *NAMETBD2*. The *NAMETBD1* is a binary sequence used by the receiver for PPDU detection, symbol timing recovery and determination of the data rate. The *NAMETBD2* is to reduce false alarm rate. For 250kbps data rate, the *NAMETBD1* is constructed by the TBD-bit sequence W, where each bit in the sequence is mapped to an OOK symbol of duration 2 µs. For 1Mbps data rate, the *NAMETBD1* is constructed by the logical complement of W, where each bit in the sequence is mapped to an OOK symbol of duration 2 µs. Figure 40-*TBD1* shows the AMP-Sync field format.

**Figure 40-*TBD1* – AMP-Sync field format**

*NAMETBD1*

*NAMETBD2*

For the backscatter mode, the AMP-Sync field consists one segment: *NAMETBD3*. The *NAMETBD3* is a binary sequence used by the receiver for PPDU detection and symbol timing recovery. The *NAMETBD3* is constructed by the *TBD-bit* sequence, where each bit in the sequence is mapped to an OOK symbol of duration 2 µs. The DL AMP-Sync field for backscatter mode without frequency shift shall differentiate the operating band of sub-1GHz or 2.4GHz (how to differentiate is *TBD*).

**Text to be adopted ends here.**

**References:**

1. [11-24-1613r12](https://mentor.ieee.org/802.11/dcn/24/11-24-1613-12-00bp-specification-framework-for-tgbp.docx): Specification Framework for TGbp, Yinan Qi (OPPO)